

DESIGNSAFE-CI

A NATURAL HAZARDS
ENGINEERING COMMUNITY



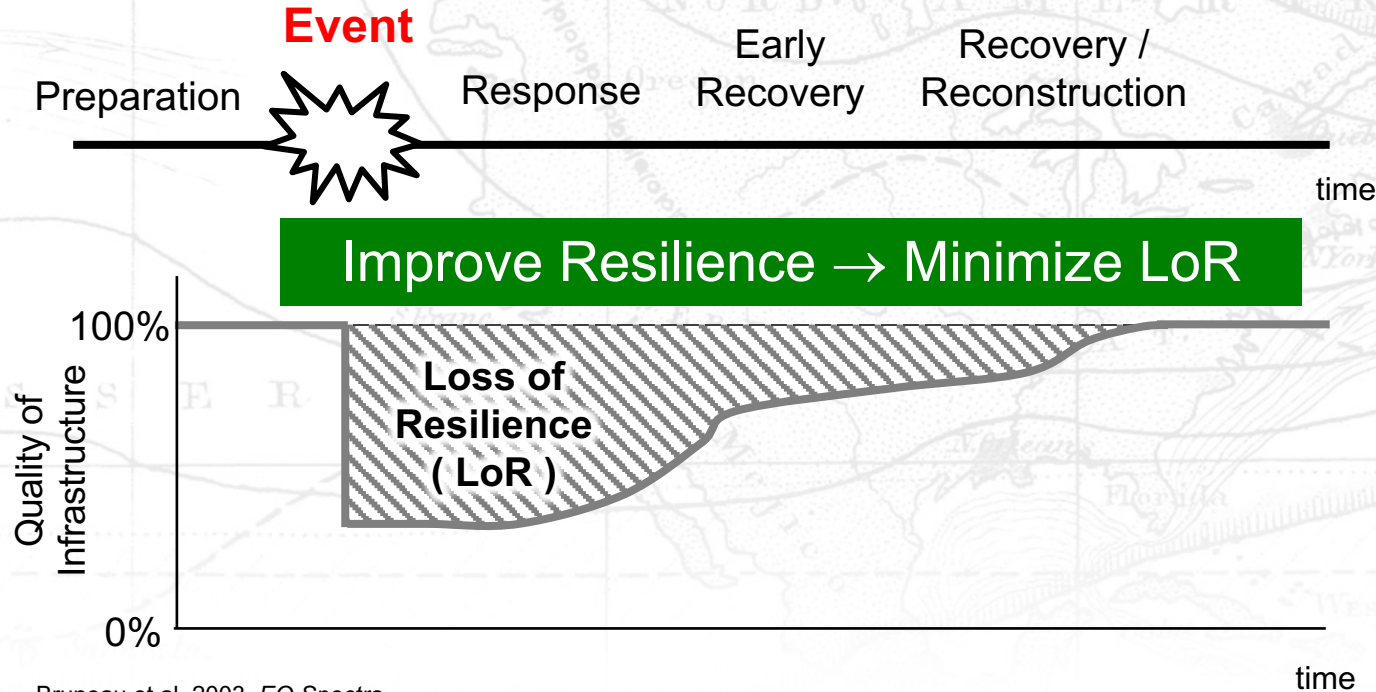
Using the DesignSafe Cyberinfrastructure to Improve Resilience Against Natural Hazards



Prof. Ellen M. Rathje, Ph.D.

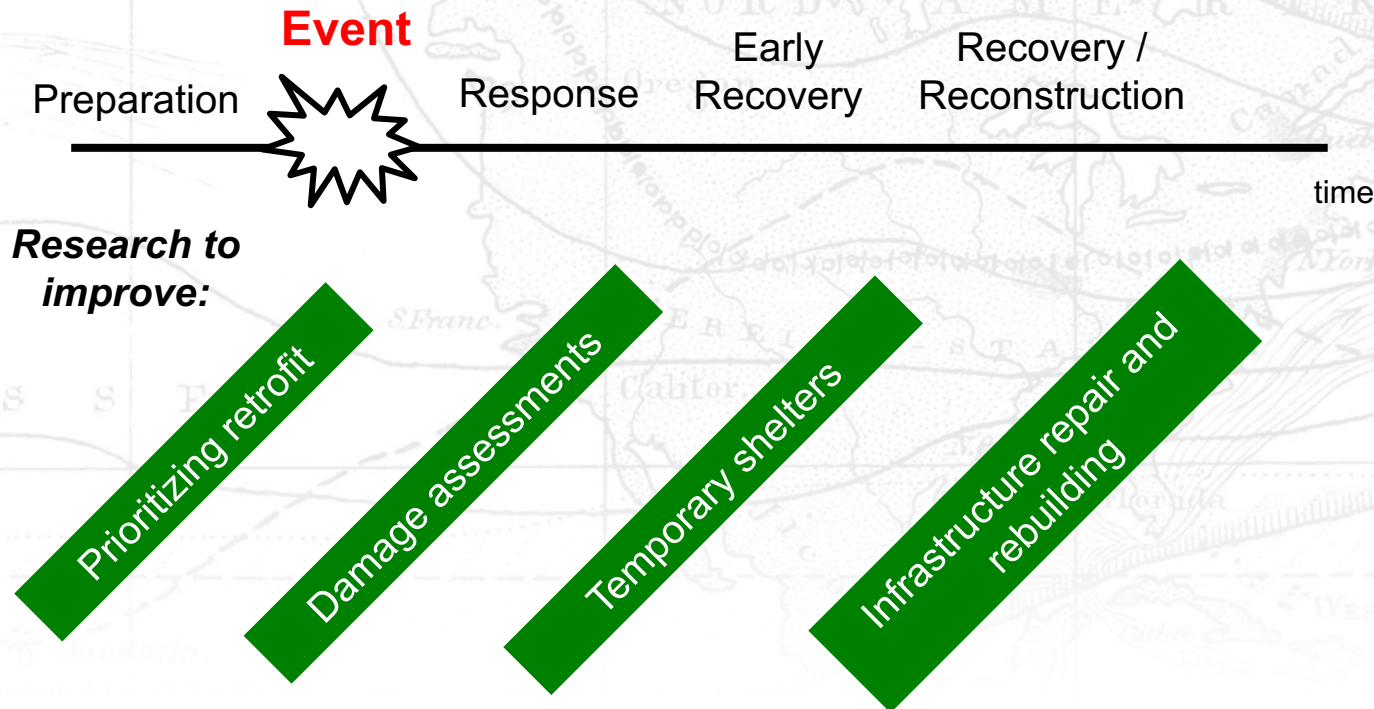
*Janet S. Cockrell Chair in Engineering
Dept. of Civil, Arch., and Env. Engineering
University of Texas at Austin*

Disaster Resilience



Bruneau et al. 2003, *EQ Spectra*

Improving Resilience



Improving Resilience-Impediments



- Limited availability of data
 - Damaging effects of previous disasters and the resulting response/recovery/rebuilding
 - Experimental data investigating engineering solutions
 - Simulation data predicting effects of natural hazards
- Why is little data available?
 - Researchers may collect data but do not share it broadly
 - After data are used by a researcher, it is “filed away”
 - No mechanism to reward data sharing

[illegible]

- # DESIGNSAFE-CI
- A NATURAL HAZARDS
ENGINEERING COMMUNITY
- 

What is DesignSafe?

- A web-based research platform that provides tools to manage, analyze, and understand critical data for natural hazards research

DesignSafe Vision

- A cyberinfrastructure (CI) that is an integral part of research discovery
 - Provide a platform for data sharing/publishing
 - Enable research workflows and access to high performance computing (HPC)
 - Deliver cloud-based tools that support the analysis, visualization, and integration of diverse data types
- Amplify and link the capabilities of natural hazards researchers in the US and abroad



Natural Hazards
Engineering
Research
Infrastructure

- DesignSafe cyberinfrastructure
- Seven experimental facilities
- RAPID reconnaissance facility
- Computational modeling and simulation center (SimCenter)
- Coordinating Office (NCO)



Research Workbench ▾

- Data Depot
- Workspace
- Recon Portal
- SimCenter Research Tools
- User Guides

Learning Center ▾

NHERI Facilities ▾

NHERI Community ▾

About

Help ▾

Search DesignSafe



Learn how to
Start Using DesignSafe



Browse the Data Depot's
Published Data Sets



Join the conversation in
DesignSafe's Slack Channel

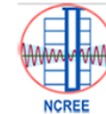
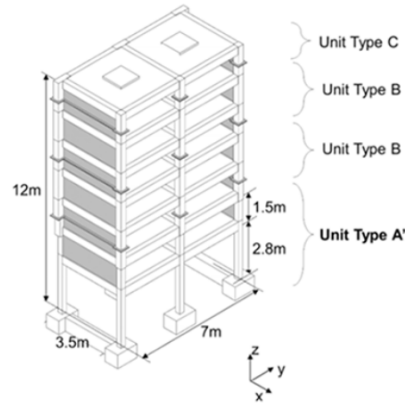


Learn more about
NHERI, the NCO & DesignSafe



NHERI Five-Year
Science Plan

used research
network that
al tools needed to
understand critical
research.



3-D and first storey plan view of test specimens

QuakeCoRE/NCREE Blind Prediction Competition

The QuakeCoRE center in New Zealand, in collaboration with the National Centre for Research on Earthquake Engineering (NCREE) in Taiwan and DesignSafe in the US, is excited to announce a competition to predict the response of reinforced concrete (RC) structures with torsional irregularities to earthquake shaking. Expressions of interest are due by 5 pm on May 01, 2019 (New Zealand time).

[FIND MORE NEWS IN THE NEWSROOM](#)

DesignSafe Research Workbench

- Data Depot Data Repository
 - Private space (My Data)
 - Collaboration space (My Projects) for data sharing and ultimate publishing
 - Publicly accessible space (Published) for curated data from My Projects
 - Publicly accessible space (Community Data) for uncurated data
- Discovery Workspace
 - Apps/tools for computational simulation, data analysis, etc. with access to files in Data Depot
- Reconnaissance Portal: discover published reconnaissance data
- SimCenter Research Tools: advanced simulation tools

Data Depot: My Projects

DATA DEPOT

[+ Add](#)

- My Data
- My Projects**
- Shared with Me
- Box.com
- Dropbox.com
- Google Drive
- Published

Project ID	Project Title	PI	Last Modified
PRJ-2440	Ridgecrest, CA earthquake, July 4, 2019	Scott Brandenburg	9/11/19 8:56 AM
PRJ-2531	TxDoT - Seismic Vulnerability and Post-Event Actions	Patricia Clayton	8/29/19 1:36 PM
PRJ-1716	NHERI TallWood Project_Task 4a	Shiling Pei	8/29/19 9:31 AM
PRJ-1437	Simulation Test Project	Ellen Rathje	8/28/19 2:31 PM
PRJ-2466	DesignSafe-QuakeCoRE Cyberinfrastructure Workshop	Ellen Rathje	8/27/19 2:53 AM
PRJ-1729	NHERI@UTexas Nonintrusive Sinkhole 3D-Imaging Workshop	Kenneth Stokoe	8/21/19 10:34 AM
PRJ-2504	Vorticity-Advection-RODSEX experiment	Steve Elgar	8/19/19 1:27 PM

***A space to share files/data/results with collaborators
and to eventually publish for public use***

Data Curation Philosophy








- Allow users to easily store, share, document, and publish data throughout the life of a research project
- Flexible data models and interactive curation
 - Allows researchers to decide how to represent their research
 - Support different types of data
 - Consider what is needed for data to be understandable by others for data reuse



DesignSafe Data Models

Structured, yet flexible, data models for different types of research

-  **Experimental Project**
For physical work, typically done at an experimental facility or in the field.
-  **Simulation Project**
For numerical and/or analytical work, done with software.
-  **Hybrid Simulation Project**
For work using both physical and numerical components.
-  **Field Research Project**
For work done by observation in areas affected by a natural hazard.
-  **Other Project**
For work other than the project types above.

Curation

- Define categories
- Assign files/folders to categories
- Relate categories to organize data

Curation Process

PRJ-2363
SILTS AND

PI
CoPIs
Project Type
Awards
Keywords

Earthquake-indu
exhibiting either
soils, which are
and not in the fr
centrifuge mode
containing all of

Working Direc

Main / Experime

☒ Name

☐ .ipynb_

☐ 020720

☐ 020720

☐ 02072018@092140@112100@64.4rpm.txt

Relate Data

JZB01

Report

Digital Data Report

↑

↓

Remove

-- Choose a Report --

Model Config

Structural Model

↑

↓

Remove

Sensor

Pluck Testing

↑

↓

Remove

Event

Pluck Testing

↑

↓

Remove

-- Choose an Event --

Sensor

Consolidation on Hydraulic Press

↑

↓

Remove

Event

Consolidation on Hydraulic Press

↑

↓

Remove

-- Choose an Event --

18.0 MB

5/28/19 10:24 AM

Publication Preview

1 Add Experiments | 2 Add Categories | 3 Relate Data

	Size	Last modified
	--	5/28/19 10:25 AM

Save

Curation Process

Working Directory

Curation Directory

Publication Preview

1 Add Experiments | 2 Add Categories

Main / Experiment JZB01

☒ Name

☐ .ipynb_checkpoints

-- Select a Collection --

Save

☐ 02072018@092140.bin

Slow Data from Spin 5 (Administered Dynamic Shaking)

Remove

Slow Data

-- Select a Event File Tag --

Save

-- Select a Collection --

Save

☐ 02072018@092140@112100@64.4rpm.bin

Fast Data from Spin 5 (Dynamic Shaking Data)

Remove

Fast Data

-- Select a Event File Tag --

Save

-- Select a Collection --

Save

☐ 02072018@092140@112100@64.4rpm.txt

Fast Data from Spin 5 (Dynamic Shaking Data)

Remove

Fast Data

-- Select a Event File Tag --

Save

-- Select a Collection --

Save

Working Directory

Curation Directory

Publication Preview

Prepare to Publish →

Report | Data Processing

Experiment | JZB01

Experiment Type

Authors

Experimental Facility

Equipment Type

Date of Experiment

Date of Publication

DOI

License(s)

Centrifuge

Buenker, Jason; Brandenberg, Scott; Eslami, Mohammad; Stewart, Jonathan

Center For Geotechnical Modeling, UC Davis

9m Radius Dynamic Geotechnical Centrifuge

08-21-2017 — 02-08-2018

(Appears when published)

(Appears when published)

(Appears when published)

This experiment tested three structures resting on a fine-grained soil layer consisting of non-plastic silt blended with bentonite. A sequence of earthquake ground motions was applied to the model container. Measurements included acceleration, displacement, pore pressure, bending strain, axial strain, and shear wave velocity.

Report | Digital Data Report

An interactive Jupyter notebook that describes Experiment JZB01.

Main / Experiment JZB01

UCLA_ModelJZB01_DataReport.ipynb

844.7 kB

Model Configuration | Structural Model

Sensor Information | Centrifuge (consolidation)

Event | Fast Data from Spin 5 (Dynamic Shaking Data)

Event | Slow Data from Spin 1 (Structure 1 Tipped Over)

Event | Slow Data from Spin 2 (Structure 1 Tipped Over)

Data Depot Search

DATA DEPOT

+ Add

My Data

My Projects

Shared with Me

Box.com

Dropbox.com

Google Drive

Published

Community Data

▶ Curation Tutorials

❗ Curation Guidelines

❗ Learn About the
Data Depot

liquefaction



Rename

Move

Copy

Preview

Preview Images

Citation

Download

Move to Trash

← Back to all publications

42 Results found for **liquefaction**

Publication Type

☐ Experimental ☐ Simulation ☐ Hybrid Simulation ☐ NEES ☐ Other

Publication Title	Author	Publication Description	Keywords	Date of Publication
LEAP-Asia-2018: Stress-strain response of Ottawa sand in Cyclic Torsional Shear Tests (Experimental)	Ueda, Kyohei	View Description	Cyclic Torsional Shear, Liquefaction resistance, Ottawa sand, Stress-strain response	12/4/2018
UNDERGRADUATE RESEARCH EXPERIENCE (REU), NHERI 2018: THE LIQUEFACTION POTENTIAL OF GROUND MODIFIED BY POORLY BUILT RAMMED AGGREGATE PIERS (Other)	Re, Abigail	View Description	Mobile Shakers, Rammed Aggregate Pier, Multi-Mode Device, Free-Free Resonant Column, Modified Effort Compaction, Liquefaction	8/9/2018
Next Generation Liquefaction (NGL) Partner Dataset - Boring Log Viewer (Other)	Brandenberg, Scott	View Description	Liquefaction, Database, Boring Log	3/11/2019

Make ****your**** data count!

- **Formally publish** data sets in stable data repositories
 - Include data processing scripts, visualizations, etc.
- Data needs a permanent, **digital location (DOI)** not just a URL
 - List curated data sets on your CV
- Formally cite data **in your reference list** of your papers using DOI, citation language as indicated in DesignSafe



PRJ-2432 | BAYESIAN IDENTIFICATION OF A PROTOTYPE NONLINEAR ENERGY SINK DEVICE

PI Lund, Alana
CoPIs Bilonis, Ilias; Dyke, Shirley; Song, Wei
DOI [10.17603/ds2-2etk-mr72](https://doi.org/10.17603/ds2-2etk-mr72)
Project Type Experimental
Related Work Lund, A., S.J. Dyke, W. Song, & I. Bilonis (In press). Global Sensitivity Analysis for the Design of Nonlinear Identification Experiments. Nonlinear Dynamics.
Keywords Nonlinear Energy Sink, System Identification, Sobol' Sensitivity Analysis, Unscented Kalman Filter

Nonlinear energy sinks devices are structural attachments which have the potential to enhance passive structural control in earthquake-sus structures, similar to tuned mass dampers. These devices are designed to leverage geometric nonlinearities in their construction to extract energy from the primary structure over a wide range of frequencies. Prior to implementing these devices in real-world structures, additional characterization of their behavior and establishment of identification and monitoring techniques is necessary. In this project, the results of w given in the linked publications, we develop a robust method for identifying a prototype nonlinear energy sink device which leverages Sobol analysis to inform the implementation of an unscented Kalman filter identification approach.

Citation

Lund, Alana; Silva, Christian; Dyke, Shirley; Song, Wei; Bilonis, Ilias (2019-07-15)
"Bayesian Identification of a Prototype Nonlinear Energy Sink Device." DesignSafe-CI.
<https://doi.org/10.17603/ds2-2etk-mr72>.


Download Citation

Reconnaissance Portal

Identifying Archived Datasets from Recon Events




Recon Portal → Data Depot



Recon Portal

[Back to results](#)



2016 Kaikoura Earthquake
Kaikoura, New Zealand
2016-11-14 earthquake

Available datasets:

- Kaikoura Earthquake Reconnaissance
- GEER Reconnaissance Report
- Landslide Inventory

[Add](#)

Published / [PRJ-1699](#)

PRJ-1699: KAIKOURA EARTHQUAKE LANDSLIDE INVENTORY

PI	Rathje, Ellen	View Team Members	DOI	doi:10.17603/DS2508W	Citation
Date of Publication	Oct/16/2017		Award	CMMI-1300744	
Project Type	Other		Keywords	Kaikoura earthquake, landslides, earthquake	
Associated Projects	GEER Association - http://www.geerassociation.org/				

Description

The Mw 7.8 Kaikoura, New Zealand earthquake occurred on November 13, 2016 and induced significant landslides across the mesoseismal area. The Geotechnical Extreme Events Reconnaissance (GEER) Association organized a reconnaissance team to investigate the event, and part of that team was focused on the landslide effects. The GEER team assessed the spatial distribution of landslides rapidly after the earthquake using available optical imagery and visual identification techniques. The goal was to develop within days a detailed landslide inventory that could be used to guide response and reconnaissance efforts. This project contains the developed landslide inventory and describes the process used to create the inventory. The project contents are summarized in the README file.



Name	Size	Last modified
_README.pdf	365.0 KB	10/18/17 9:55 AM
Description of Landslide Identification Analysis.pdf	1.1 MB	10/18/17 9:55 AM
Landslide Inventory -- GEOJSON	--	10/18/17 9:55 AM

Discovery Workspace

- Cloud-based tools and HPC enabled codes (Stampede2)
- Access to files in the Data Depot

WORKSPACE

[Learn About the Workspace.](#)

Simulation [8]	Visualization [7]	Data Processing [2]	Partner Data Apps [5]	Utilities [2]	My Apps [7]
Jupyter 	MATLAB 				

Browsing:
erathje

File name

- .ipynb_checkpoints
- .Trash

Select an application from the tray above.

The *Workspace* allows users to perform simulations and analyze data using popular simulation codes including OpenSees, ADCIRC, and OpenFOAM, as well as data analysis and visualization tools including Jupyter, MATLAB, Paraview and VisIt.

Jobs Status

DesignSafe Discovery Workspace



- Data analysis in the cloud
 - Matlab: data analysis and plots, batch processing
 - Jupyter: electronic notebook that supports Python and R analysis
- Visualization
 - HazMapper: DesignSafe version of “Google Maps”
 - Potree: Create, view, and analyze point cloud data
 - QGIS: geospatial data analysis
 - Kalpana and FigureGen: data converter and plot generation for ADCIRC storm surge outputs





Electronic Notebook

entrifugeBinary: x Data Depot Browser | Desktop x

mock/notebooks/mydata/jupyter/ReadWriteCentrifugeBinaryFastData_v_4.ipynb

jupyter ReadWriteCentrifugeBinaryFastData_v_4 Last Checkpoint: Last Wednesday at 9:15 AM (unsaved changes) Control Panel Logout

File Edit View Insert Cell Kernel Help Saving every 120s Python 3

Project Name:

Development of validated methods for soil-structure interaction analysis of buried structures

Project Team:

Elnaz Esmailizadeh

Funded by:

California Department of Transportation

Instructions:

This code is for writing data to a file.

The user can:

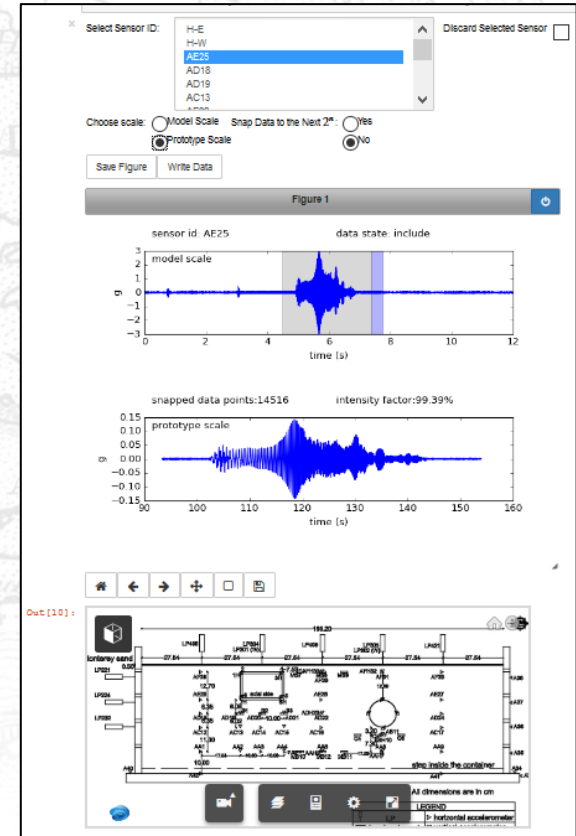
- 1) Discard the sensor data.
- 2) Truncate data to a specific time range.

```
bwrite = widgets.Button(description='Write Data')
bdiscard = widgets.Checkbox(description='Discard Selected Sensor', value = False)
bsave = widgets.Button(description='Save Figure')
bmodpro = widgets.RadioButtons(description='Choose scale: ', options=['Model Scale', 'Prototype Scale'])
bsnap = widgets.RadioButtons(description='Snap Data to the Next '+ '$2^n$ '+ ':', options=['Yes', 'No'], value = 'No')

ccontainer = widgets.HBox(children=[sensor_select, bdiscard])
rcontainer = widgets.HBox(children=[bmodpro, bsnap])
bcontainer = widgets.HBox(children=[bsave, bwrite])
display(ccontainer)
display(rcontainer)
display(bcontainer)

bdiscard.observe(callback.discard)
bmodpro.observe(callback.scaledata)
bsnap.observe(callback.snap)
bwrite.on_click(callback.writedata)
bsave.on_click(callback.savefigure)
callback.truncate()
```

Intensity Factor = $\frac{\sum_{i=1}^N s^2(t_i)}{\sum_{i=1}^N s(t_i)}$ where $1 \leq i \leq N$



From Prof. S. Brandenburg, UCLA

Published Scripts to Aid Research to Practice

Find in Data Depot

TagRenameMoveCopyPreviewPreview ImagesDownload

My Data

My Projects

Shared with Me

Box.com

Dropbox.com

Google Drive

Published

Community Data

Learn About 'My Projects'

Published

**PRJ-169
DISPLAC**

PI

Date of Publication

Project Type

Description

The seismic pe
project include
expected slidin
hazard in term
notebook inter
directly from th
(2009). Probab

Click here to show/hide the code

DEAGGREGATION INPUT

Latitude37.75

Longitude-122.11

Site ClassB/C Boundary (760 m/s)

Spectral Period*Peak Ground Acceleration

*USGS provides deaggregation data for the above spectral periods only

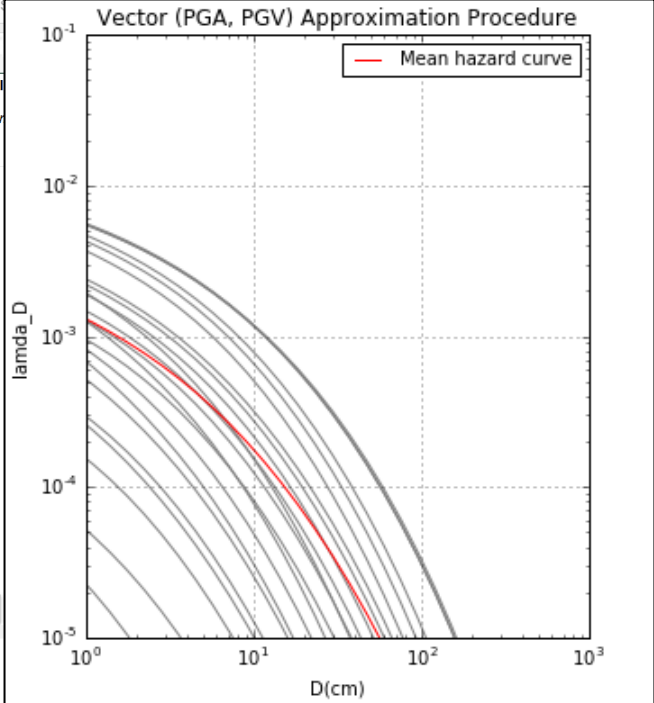
RETURN PERIODS

Return periods used in this analysis (years):

304372108144224336475712975146219502475

- Return periods can be between 1 and 20,000 inclusive
- Please make changes on the [return_periods.csv](#) file to edit the return periods

Vector (PGA, PGV) Approximation Procedure



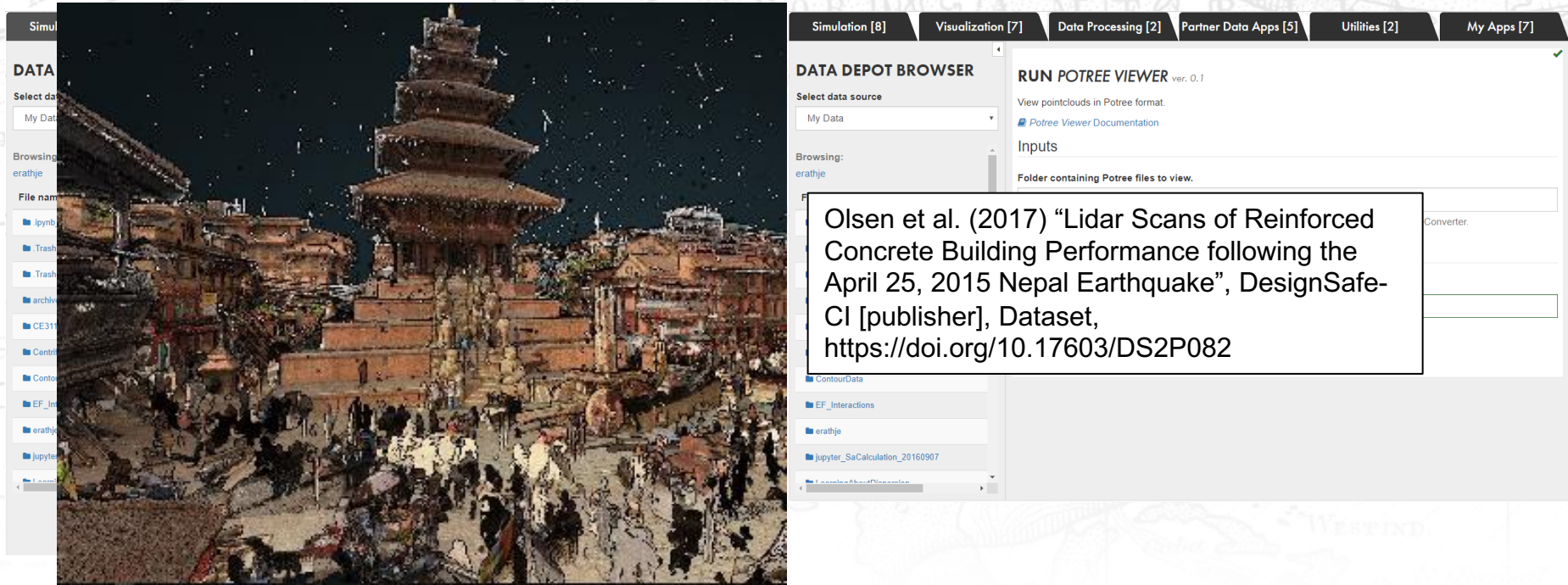
The figure is a log-log plot titled "Vector (PGA, PGV) Approximation Procedure". The vertical axis is labeled λ_D and ranges from 10^{-5} to 10^{-1} . The horizontal axis is labeled $D(\text{cm})$ and ranges from 10^0 to 10^3 . The plot contains several downward-sloping curves. One curve is highlighted in red and labeled "Mean hazard curve" in the legend.

Recon Portal → Data Depot → Workspace

The screenshot displays the Recon Portal interface, which is divided into several sections:

- Left Sidebar:** Contains a navigation menu with options: "My Data", "My Projects", "Shared with Me", "Box.com", "Dropbox.com", "Google Drive", "Published", and "Community Data". Below the menu is a "Curation Tutorials" link.
- Main Content Area:** Displays a project titled "2016 Kaikoura Earthquake" with a subtitle "Kaikoura, New Zealand" and a date "2016-11-14". Below this, a red-bordered box highlights the "Available datasets" section, which lists:
 - Kaikoura Earthquake Reconnaissance
 - GEER Reconnaissance Report
 - Landslide Inventory
- Right Panel:** Shows a "HazMapper" workspace for the project "Kaikoura Landslide Recon". It includes a "New Layer Group" button and a list of layers:
 - Wartman photos (1 features)
 - Image
 - Rathje Photos (7 features)
 - Cow Slip Slide
 - Coastal Slide
 - Leader River Slide
 - Leader River Slide
 - Leader River Slide
 - Image
 - Culvert
 - GPS tracks (2 features)
 - Rathje Dec 1 2016
 - Rathje Dec 3 2016
 - UT Landslide Inventory (1 features)
 - Landslide Inventory
- Map View:** A 3D topographic map showing the earthquake area with red dots indicating landslide locations. A pink line outlines a specific area of interest.
- Bottom Right:** A text box explains that maps can be created and edited in the HazMapper and shared with other researchers via the DataDepot. A blue button labeled "Launch HazMapper" is positioned below the text.

Potree Point Cloud Viewer



The screenshot displays the Potree Point Cloud Viewer interface. On the left, a sidebar shows a file tree with folders like 'ipynb', 'Trash', 'archive', 'CE31', 'Conti', 'Conto', 'EF_In', 'erathje', and 'jupyter'. The main panel features a top navigation bar with tabs: 'Simulation [8]', 'Visualization [7]', 'Data Processing [2]', 'Partner Data Apps [5]', 'Utilities [2]', and 'My Apps [7]'. Below the tabs, the 'DATA DEPOT BROWSER' section allows selecting a data source (currently 'My Data') and shows a browsing path: 'erathje'. The 'RUN POTREE VIEWER' section (version 0.1) includes a link to 'Potree Viewer Documentation' and an 'Inputs' section with a text box for a folder path. A text box overlay on the right side of the interface contains the following text:

Olsen et al. (2017) "Lidar Scans of Reinforced Concrete Building Performance following the April 25, 2015 Nepal Earthquake", DesignSafe-CI [publisher], Dataset, <https://doi.org/10.17603/DS2P082>

Computational Simulation Codes

- OpenSees: FE code for seismic analysis of structures and soil
 - OpenSees Express: runs on a virtual machine
 - OpenSees MP and SP: run on Stampede2
 - Python interpreter for OpenSees available through Jupyter
- **Coming soon!**
 - STKO (Scientific Tool Kit for OpenSees): pre/post processing
- LS-Dyna: Commercial FE code for structures and soil
 - “Bring Your Own License”, submit a ticket to get access
 - Runs on Stampede2

Computational Simulation Codes

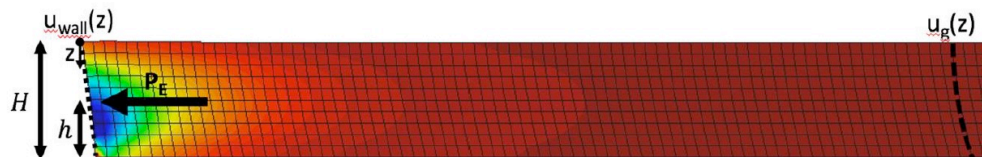
- ADCIRC: storm surge modeling
 - ADCIRC: serial version
 - PADCIRC: parallel version on Stampede2 and Lonestar5
 - PADCIRC + SWAN: includes near shore waves
 - Kalpana available to convert NetCDF to Shapefiles
 - FigureGen available to create images of ADCIRC output
- OpenFOAM: computational fluid dynamics
- Clawpack/GeoClaw: PDE solver for storm surge modeling

Access to Command Line (CLI)

- HPC-enabled simulation codes in the Workspace lowers the bar to researchers trying to access HPC
- All of these simulation codes are also available from the Command Line
 - Requires HPC allocation through DesignSafe
 - <https://www.designsafe-ci.org/rw/user-guides/allocations-policy/>
- Codes can also be accessed through Jupyter
 - Requires knowledge of Agave API

OpenSees Workflow Example

Seismic Earth Pressures on Retaining Walls



WORKSPACE

Learn About the Workspace.

Simulation [15]

Jupyter



Dakota



Visualization [7]

MATLAB R2017b



LS-DYNA



Data Processing [3]

MATLAB



LS-Pre/Post



Partner Data Apps [4]

Parallel SWAN+ADCIRC
240 cores (Lonestar5)

ADCIRC

OpenFOAM



30,000 analysis parametric study

Output files saved to Data Depot

Post-processed in DesignSafe
using matlab script

Durante et al. (2018) GEESD V, Austin, TX

OpenSees Workflow Example

Develop analytical expressions to predict earth pressure from input time history and model properties

WORKSPACE

[Learn About the Workspace.](#)

Simulation [15]

Visualization [7]

Data Processing [3]

Partner Data App



Dakota



MATLAB R2017b



LS-DYNA



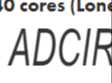
MATLAB



LS-Pre/Post



Parallel SWAN+
240 cores (Long)

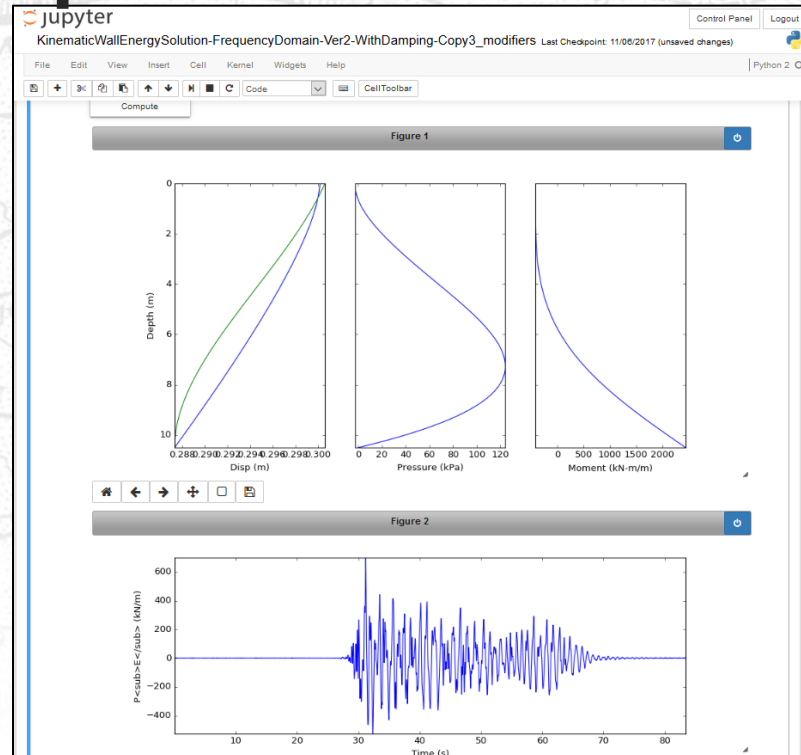


OpenFOAM



Select a motion
Test1_Immit-2.dat
Test1_Immit.dat
Test1_LomaPrieta.dat
Test1_Northridge-H.dat
Test1_Northridge-L.dat

H (m)	10.5
y/H	1.06
L/H	2.84
aoc modifier	1.386
b	0.01
n	0.25
V_H (m/s)	221
G/G_0	1
$\rho(Mg/m^3)$	1.59
Damping	0.05
K_{st} (kN/m/m)	0
K_{st} (kNm/rad/m)	425000
K_{sp} (kN/m/m)	$1e+32$
K_{sp} (kNm/rad/m)	$1e+32$
ν	0.3
EI (kN-m ² /m)	2930000
N	10
Use Frequency-Dependent Stiffness	<input type="checkbox"/>
Compute	



ADCIRC Workflow Example

What addresses will be inundated on Galveston Island by storm surge from the impending hurricane?

- Compute storm surge water levels with ADCIRC
- Convert NetCDF output to shapefile format
- Import results into a QGIS along with elevation and property data
- Identify addresses that are inundated by simulated water levels

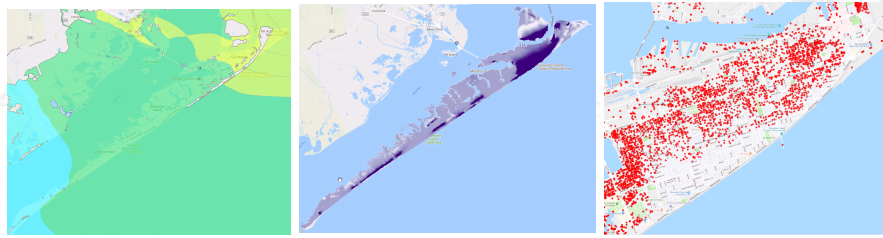
WORKSPACE

Learn About the Workspace.

Simulation [8]	Visualization [7]	Data Processing [2]	Partner Data Apps [5]	Utilities [2]	My Apps [7]
ADCIRC ADCIRC	clawpack C	Dakota D	LS-DYNA LS-DYNA	OpenFOAM OpenFOAM	OpenSees OpenSees

Simulation [8]	Visualization [7]	Data Processing [2]	Partner Data Apps [5]	Utilities [2]	My Apps [7]
FigureGen F	Hazmapper Hazmapper	Kalpana K	Paraview Paraview	Potree Converter P	Potree Viewer P

QGIS
QGIS




- Output placed in My Data
- Shapefile conversion performed using Kalpana
- Data integration and analysis in QGIS

Partner Data Apps

WORKSPACE

[Learn About the Workspace.](#)

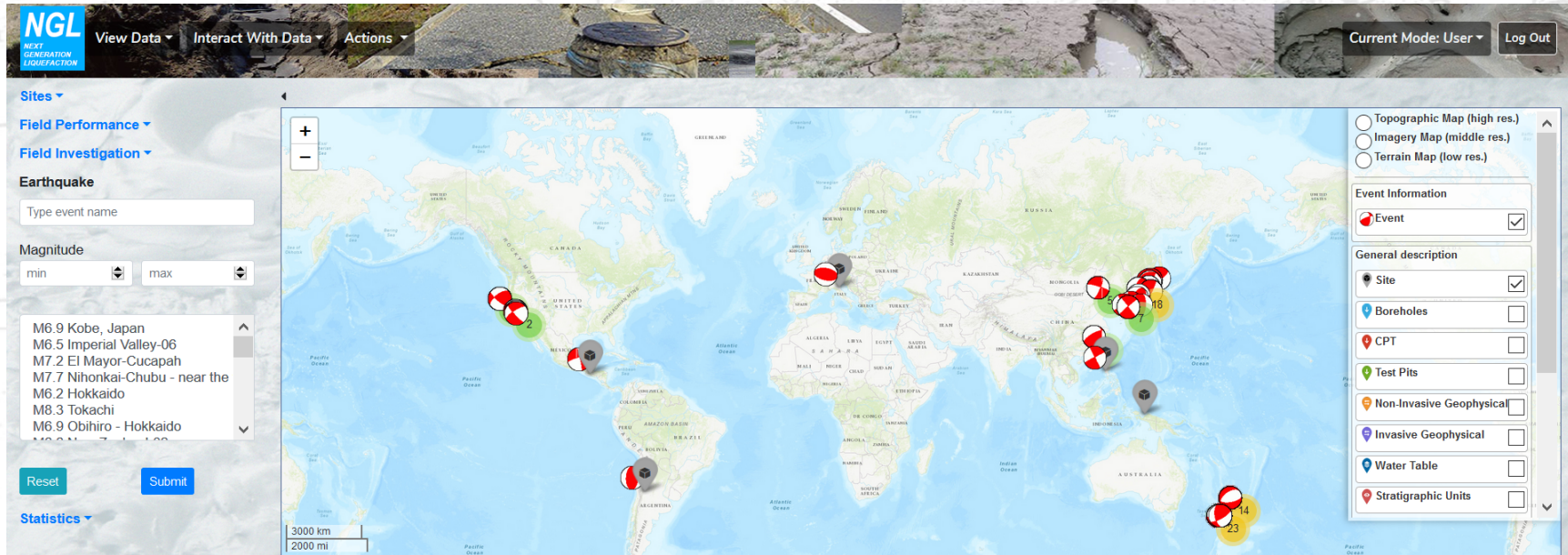
Simulation [8]	Visualization [7]	Data Processing [2]	Partner Data Apps [5]	Utilities [2]	My Apps [7]
Hurricane Data Analysis H	NEXT-GENERATION LIQUEFACTION 	SCEC BBP Ground-Motion Portal S	TPU Wind Databases T	VORTEX-Winds: DEDM-HR V	

- Jupyter-based tools to access archived datasets
- Archived webinar from February 27, 2019

Next Generation Liquefaction (NGL)

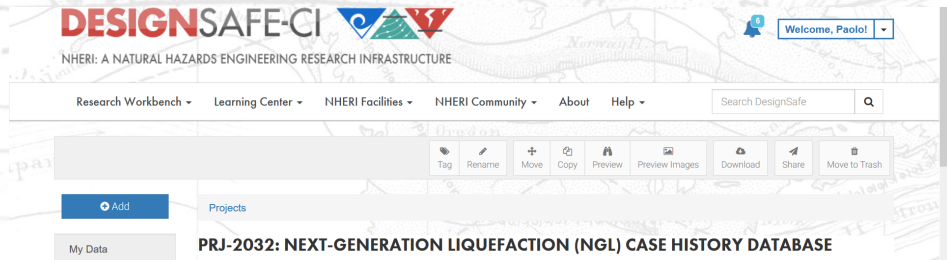
www.nextgenerationliquefaction.org

- Community database of liquefaction case histories



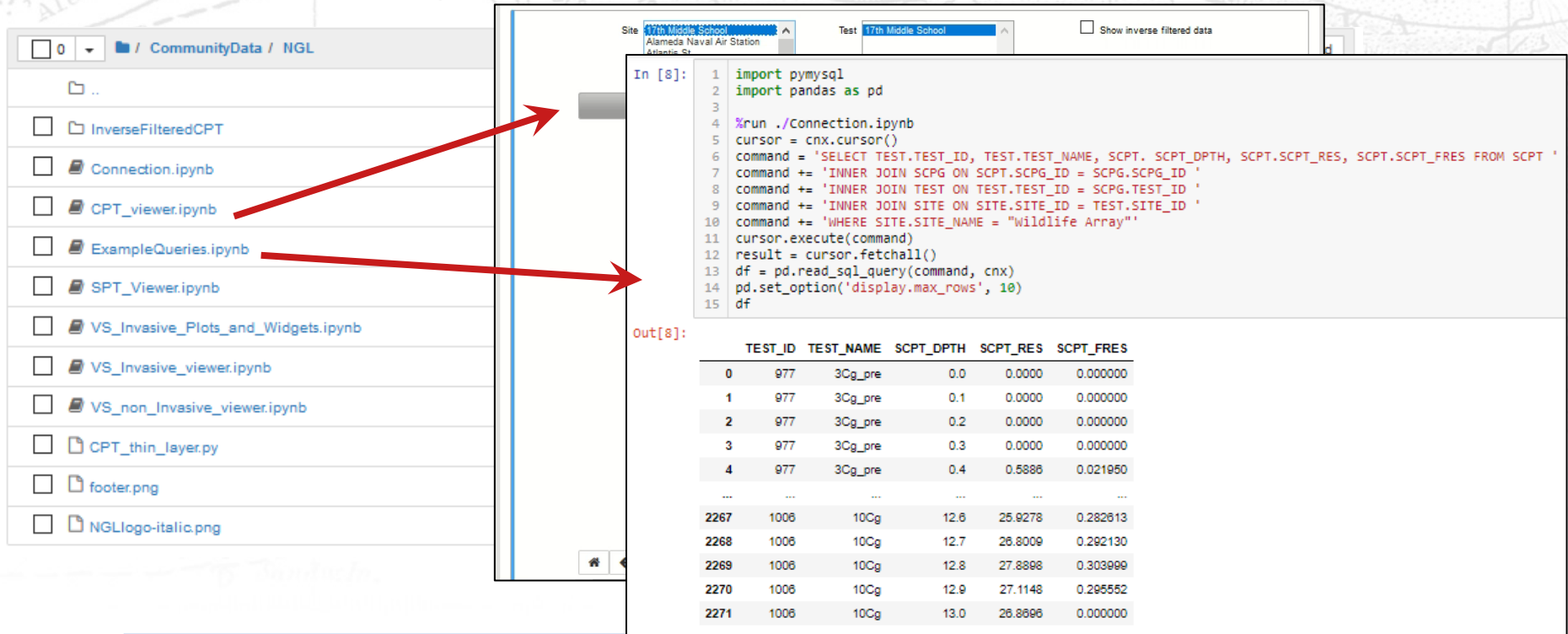
Next Generation Liquefaction (NGL)

- Data housed in SQL database
 - <http://nextgenerationliquefaction.org/schema/index.html>
- Database replicated to DesignSafe daily
- Jupyter notebooks to access data available in DesignSafe



From P. Zimmaro, UCLA

NGL Jupyter Notebooks



The screenshot displays the NGL Jupyter Notebook interface. On the left is a file explorer showing the directory structure: `CommunityData / NGL`. The files listed are: `..`, `InverseFilteredCPT`, `Connection.ipynb`, `CPT_viewer.ipynb`, `ExampleQueries.ipynb`, `SPT_Viewer.ipynb`, `VS_Invasive_Plots_and_Widgets.ipynb`, `VS_Invasive_viewer.ipynb`, `VS_non_Invasive_viewer.ipynb`, `CPT_thin_layer.py`, `footer.png`, and `NGLlogo-italic.png`. Two red arrows originate from the file explorer: one points to the `CPT_viewer.ipynb` file, and the other points to the `ExampleQueries.ipynb` file.

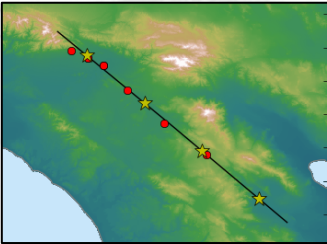
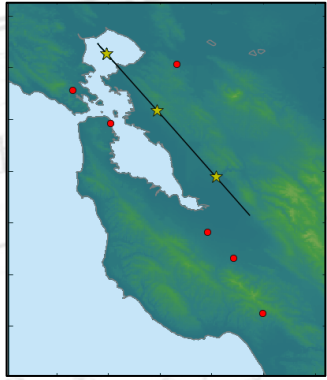
The main area shows the code editor for `ExampleQueries.ipynb`. The code is as follows:

```
In [8]: 1 import pymysql
2 import pandas as pd
3
4 %run ./Connection.ipynb
5 cursor = cnx.cursor()
6 command = 'SELECT TEST.TEST_ID, TEST.TEST_NAME, SCPT. SCPT_DPTH, SCPT.SCPT_RES, SCPT.SCPT_FRES FROM SCPT '
7 command += 'INNER JOIN SCPG ON SCPT.SCPG_ID = SCPG.SCPG_ID '
8 command += 'INNER JOIN TEST ON TEST.TEST_ID = SCPG.TEST_ID '
9 command += 'INNER JOIN SITE ON SITE.SITE_ID = TEST.SITE_ID '
10 command += 'WHERE SITE.SITE_NAME = "Wildlife Array"'
11 cursor.execute(command)
12 result = cursor.fetchall()
13 df = pd.read_sql_query(command, cnx)
14 pd.set_option('display.max_rows', 10)
15 df
```

The output of the code is a table with 10 rows (displayed) and 6 columns: `TEST_ID`, `TEST_NAME`, `SCPT_DPTH`, `SCPT_RES`, and `SCPT_FRES`.

	TEST_ID	TEST_NAME	SCPT_DPTH	SCPT_RES	SCPT_FRES
0	977	3Cg_pre	0.0	0.0000	0.000000
1	977	3Cg_pre	0.1	0.0000	0.000000
2	977	3Cg_pre	0.2	0.0000	0.000000
3	977	3Cg_pre	0.3	0.0000	0.000000
4	977	3Cg_pre	0.4	0.5886	0.021950
...
2267	1006	10Cg	12.6	26.9278	0.282613
2268	1006	10Cg	12.7	26.8009	0.292130
2269	1006	10Cg	12.8	27.8898	0.303999
2270	1006	10Cg	12.9	27.1148	0.295552
2271	1006	10Cg	13.0	26.8696	0.000000

Broadband ground motion simulations



- SCEC Broadband Platform Dataset 17.3
 - Simulations for design levels events in NoCal and SoCal
 - Time series published as a DesignSafe data set
 - Jupyter notebook tool to search and select motions

+

Add

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My Projects




Shared with Me

Box.com

Dropbox.com

Google Drive

Published

Name	PI	Date of Publication	Project Type	Project Number
 RAPID: A Coordinated Structural Engineering Response to Hurricane Irma (in Florida)	Kijewski-Correa, Tracy	Jun/19/2018	Other	PRJ-1828
 SCEC BBP Study 17.3 Dataset	Goulet, Christine	Jun/13/2018	Other	PRJ-1975
 Identification of Urban Flood Impacts Caused by Land Subsidence and Sea Level Rise for the	Fang, Nick	Jun/7/2018	Simulation	PRJ-1972

SCEC BBP Ground Motion Portal

jupyter Run_me Last Chec

File Edit View Insert Cell

In [1]: %run ./SCEC_BBp_GMport

SCEC BBP

The SCEC Broadband Platform provides historical and scenario earthquake alternative computational models. The goal of the SCEC Broadband Platform is to provide motions for earthquakes. The project involving SCEC research software development group Platform including rupture generation, site effects, and visualization of seismograms. The SCEC Broadband Platform provides motions for earthquakes. The project involving SCEC research software development group Platform including rupture generation, site effects, and visualization of seismograms. The SCEC Broadband Platform provides motions for earthquakes. The project involving SCEC research software development group Platform including rupture generation, site effects, and visualization of seismograms.

Dataset: SCEC_BBp_Simulation_Study_17_3_180614

SEARCH CRITERIA

the Dataset contains 2074 records

Earthquake Magnitude (Range:6.6-8.0):

Mmin: 7

Mmax: 7.5

Intensity Measure:

Include: ☒ Yes ☐ No

IM: PSA_RotD50_D0pt

Period: 0.010

Search Clear Output

SAVE SEARCH RESULTS

OneWord_SearchFolderName

Save Data

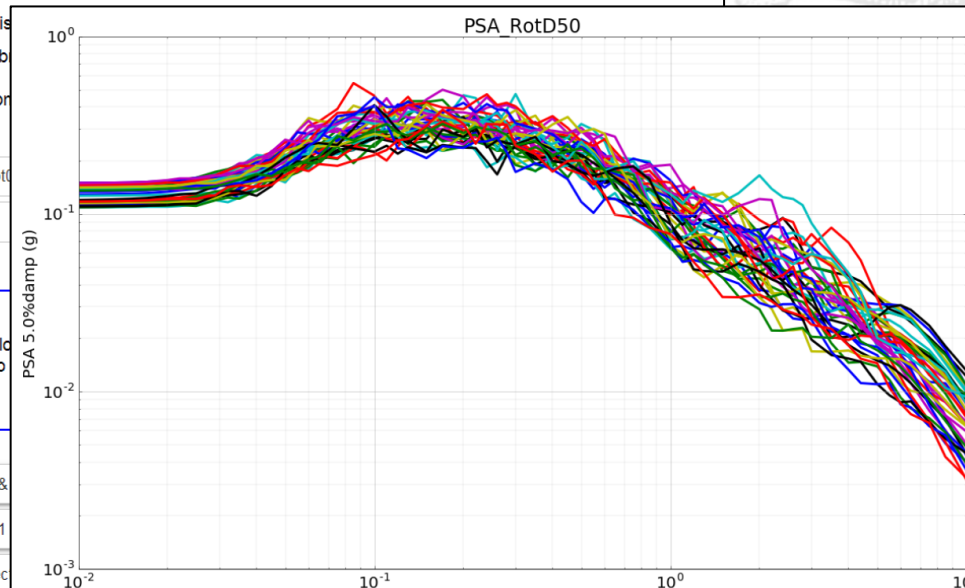
VISUALIZATION OF RESULTS

RotD50 Spectra Plot RotD100 Spectra Plot H1 & H2

RotD50 Spectra Table RotD100 Spectra Table H1

Metadata Table FileData Table Spec

Select Record To Visualize: Select Filename



SCEC BBP Ground Motion Portal

SEARCH CRITERIA

the Dataset contains 2074 records

Earthquake Magnitude (Range:6.6-8.0):

Mmin
Mmax

Rjb Distance, km (Range:0.0-116.89):

Rjbmin
Rjbmax

Intensity Measure:

Include ☒ Yes ☐ No
IM:
Period:

IMmin
IMmax

Search

Clear Output

SAVE SEARCH RESULTS

☒ Allow Overwrite
☐ No Overwrite

Save Data

VISUALIZATION OF RESULTS

RotD50 Spectra Plot

RotD100 Spectra Plot

H1 & H2 Spectra Plot

Vertical Spectra Plot

RotD50 Spectra Table

RotD100 Spectra Table

H1 Spectra Table

H2 Spectra Table

Metadata Table

FileData Table

Spectral-Periods Table

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Community Data

[Curation Tutorials](#)

[erathje](#) / [SCEC_BBp_GMportal](#) / [SCEC_BBp_SearchResults](#) / [Rathje_10to15percentg](#)

Name	Size
 SCEC_BBp_FileData.csv	9.2 kB
 SCEC_BBp_H1_SpectraData.csv	41.4 kB
 SCEC_BBp_H2_SpectraData.csv	41.4 kB
 SCEC_BBp_RecordMetadata.csv	36.1 kB
 SCEC_BBp_RotD100_SpectraData.csv	40.9 kB
 SCEC_BBp_RotD50_SpectraData.csv	42.1 kB
 SCEC_BBp_RotV_SpectraData.csv	43.3 kB
 SCEC_BBp_SearchData.txt	249.0 bytes

DesignSafe: Open for Business

- Capabilities available to the global natural hazards research community
→ account registration is free
- Working to expand our reach
 - Social science/urban planning/health care; earth science; AI/ML



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